Computer-Assisted Care in the Neonatal Intensive Care Unit

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Computers have been used in the Neonatal Intensive Care Unit (NICU) at Cedars-Sinai Medical Center (CSMC) for approximately fifteen years. Unlike many other centers, our efforts have been focused almost completely on applications that assist neonatologists and other clinicians in direct patient care.

The current CSMC NICU system is based on Apple Macintosh computers and a local area network. Personal computers are located throughout the patient care areas as well as on the desk of each neonatologist, neonatal nurse practitioner (NNP), staff nurse manager, and division secretary. Network resources include dedicated file, mail, backup, and database servers, Postscript printers, a film imager, a full-page scanner, CD-ROM drives, networked modems, and a serial connection to the hospital's VAX cluster for access to clinical laboratory and blood gas results.

Internally developed NICU applications are written in Claris Hypercard, Symantec Think C, Microsoft QuickBasic, Acius Filemaker Pro, and ACIUS 4th Dimension. Aggressive use is also made of "shrink-wrapped" software for word processing, desktop publishing, spreadsheets, graphs, custom forms development, production of slides and overheads, electronic mail, and scheduling.

We will provide interactive demonstrations of NICU computer applications in the following categories:

- On-line reference materials for medications, consultant phone numbers, NICU protocols and procedures, umbilical line and ET tube lengths and sizes, differential diagnosis, phototherapy, etc.

- Computer-assisted-instruction (CAI) modules for housestaff on common neonatal topics and CD-ROM-based literature searches.

- Quick calculation programs for intravenous solutions (IVs) and medication "drips" (pressors, sedation, bronchodilators).

- An interactive computer-assisted parenteral nutrition protocol for neonates that accepts input and output data and laboratory results, refers to the previous day's order, makes recommendations for each IV constituent, and generates a printed order for the pharmacy. The program drives IV composition toward nutritional goals over a period of days to weeks while ensuring proper monitoring.

- A real-time interface between the Macintosh network and the hospital's clinical lab system. Lab results are captured from the hospital system and archived locally on a file server, where they are immediately available to clinicians via a user-friendly, graphically-based, "point-and-click" inquiry program.

- A multi-user, client-server database for NICU patient demographic, diagnosis, procedure, and outcome data. Data is abstracted from the patient charts and entered into the computer by a research nurse on a daily basis. The database supports interactive queries on any combination of fields and can rapidly generate ad-hoc printed reports with arbitrary subsets of the data.

- Experimental interactive computer-assisted progress notes and discharge summaries. Physical exam, assessment, and diagnostic data is entered directly by MDs or NNPs, laboratory and blood gas results are incorporated automatically via the interface to the hospital system, a daily note is printed for the chart, and customizable summaries can be generated on demand.